REMARKS

Claims 2-13, 15-16, 18-22 and 24-25 have been amended. Claims 1, 17 and 23 have been canceled. Upon entry of the above amendments, claims 2-16, 18-22 and 24-30 will remain pending and under consideration in the application.

Telephonic Interview

Applicants and their attorney appreciated the opportunity to discuss the outstanding issues relating to patentability in the above-referenced application during a telephonic interview Tuesday, November 1, 2005. Participants in the interview were primary Examiner Mary E. Ceperley and Appilcants' attorney Gunther J. Evanina. Only definiteness and written description issues were specifically discussed, and only with respect to claim 19, although there was some general discussion as to how the requirement for two different types of reactive end-groups on the dendritic polymer moieties has certain advantages over using only a single type of reactive end-group, and that such advantages or other motivation for this feature are not disclosed in the prior art. No agreement was reached, other than Applicants would file a Request For Continued Examination, with a detailed explanation of where and how claim terminology is supported by the original application, along with arguments and/or explanations as to how the claim terminology complies with the definiteness requirement. Applicants were also asked to provide a more detailed explanation as to how the requirement for two different types of reactive end-groups on the dendritic polymer moieties distinguishes over the applied prior art.

Discussion Of The Claimed Inventions

Independent claim 13 is a product-by-process claim, which specifies that the product is obtained by reacting a dendritic polymer having at least two different types of reactive end-groups with a diacetylene reagent to form a diacetylene functionalized dendritic compound. The prior art only discloses preparation of a diacetylene functionalized dendritic compound by reacting a dendritic polymer having a single type of reactive end-group with a diacetylene reagent. There is absolutely no motivation in the prior art for starting with a dendritic polymer having at least two different types of reactive end-groups.

Independent claim 19 is directed to a compound in which dendritic polymer moieties are linked to one another by a moiety having alternating conjugated double and triple bonds, wherein at least one sensory group is bonded to the compound, and wherein the dendritic polymer moieties have at least two different types of reactive end-groups. It is disclosed in the specification that this compound can be prepared by the polymerizing the diacetylene functional moieties of a diacetylene functionalized dendritic compound, such as that of claim 13. As disclosed in the specification, the sensory group may be bonded directly to a reactive end-group of the original dendritic polymer, or may be bonded indirectly to the dendritic polymer moiety by a spacer moiety, which may be a diacetylene moiety. It is further disclosed that the sensory group may be bonded to the compound either after polymerization of the diacetylene moieties, or may be bonded to the resulting compound by virtue of being pre-bonded to dendritic polymers used to prepare the compound. The fact that the dendritic polymer moieties have at least two different types of reactive end-groups is not particularly important once the final compound has been formed (i.e., after a cured film has formed on a substrate). However, the use of a dendritic polymer having at least two different types of reactive end-groups in preparing the claimed compound is important for preparing coating compositions that facilitate deposition and formation of coherent films on a variety of substrates. Because the prior art does not provide any motivation for utilizing dendritic polymers having at least two different types of reactive end-groups in a process for preparing a compound in which the dendritic polymers become linked to one another through moieties having alternating conjugated double and triple bonds, a resulting product obtained by employing such dendrimers would not have been obvious.

Rejection Under 35 U.S.C. §112, First Paragraph

In the Final Rejection mailed June 28, 2005, claims 1-12 and 17-30 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner objected to the terms "a cross-linked material," "dendritic polymer blocks intermolecularly cross-linked by a linear moiety having alternating conjugated double and triple bonds" and "covalently bonded directly to the dendritic polymer block . . . a spacer

moiety" on grounds that the terminology does not comply with the written description requirement of 35 US.C. §112, first paragraph.

This rejection has been overcome by the above amendments in which the above-referenced expressions have been deleted and replaced with terminology clearly supported by the original application. More specifically, claim 1 has been canceled and claim 19 has been rewritten in independent form without reference to "cross-linked material," "dendritic polymer blocks," or "a linear moiety."

In view of the very substantial difference between the language of canceled claim 1 and amended claim 19, Applicants will explain where and how the terminology of amended claim 19 is supported by the original application.

It is believed that there can be no legitimate doubt whether the original specification supports a claim to "a compound comprising dendritic moieties linked to one another by a moiety having alternating conjugated double and triple bonds." A "compound" is defined in "*The Condensed Chemical Dictionary*," Tenth Edition, Van Nostrand Reinhold Company, New York (1981) as follows:

> (1) A substance composed of atoms or ions of two or more elements in chemical combination. The constituents are united by bonds (q.v.) or valence forces. A compound is a homogeneous entity in which the elements have definite proportions by weight, and are represented by a chemical formula (q.v.). A compound has characteristic properties quite different from those of its constituent elements; it can be decomposed by energy in the form of a chemical reaction (q.v.), of heat, or of an electric current. Example: Water is a *liquid* formed by chemical combination of two *gases*; it can be separated into hydrogen and oxygen by an electric current (electrolysis); in certain reactions it is split into its constituent ions (H and OH) (hydrolysis); it is not chemically changed by heat or cold. See also mixture; homogeneous; reaction.

Original claim 1 was directed to a "dendritic polymer network compound comprising at least one sensory group and interdendritic cross-linking segments of alternating conjugated double and triple bonds." At paragraph 26 of the originally filed specification, the expression "dendritic polymer networks" is exemplified by "cross-linked dendritic polymers." Thus, original claim 1 was directed to a compound comprised of dendritic polymers that are cross-

linked by a cross-linking segment or moiety having alternating conjugated double and triple bonds. Accordingly, there is clear support for a compound comprising dendritic polymer moieties that are cross-linked with a segment (i.e., part of the compound) having alternating conjugated double and triple bonds. Once the dendritic polymers have been cross-linked, the dendritic polymers lose their independent identity, and become part of a cross-linked network. In chemistry, a moiety is a specific segment of a molecule. For example, aniline has a phenyl moiety and an amino moiety. (See http://en.wikipedia.org/wiki/Moiety, copy attached as Exhibit 1). Employing the established, well recognized definition for the word "moiety" within the context of a chemical compound, the original specification clearly supports claims directed to a "compound comprising dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds."

The second part of claim 19 requires "at least one sensory group bonded to the compound." This requirement is supported by the original specification at paragraph 9 which discloses that "sensing groups are attached either directly to the dendritic network or through a spacer, which may or may not comprise diacetylene or polydiacetylene functional groups." This limitation is also supported at paragraph 43 of the original specification which states that "diacetylene lipids and sensing groups are both covalently attached to the amine end-groups of the dendrimer cores (Fig. 3)." From the specification, and particularly with reference to Fig. 3, it can be seen that the expression "sensing group" and the expression "sensory group" had been used interchangeably in the specification. Fig. 3 clearly shows sensory groups bonded to a diacetylene functionalized dendrimer, and Fig. 2 shows sensory groups bonded to a cross-linked compound comprising dendrimers bonded to each other. The original specification (paragraph 12) indicates that Fig. 2 is a schematic of "a generalized structure of a dendrimer-based network cross-linked with alternating conjugated double and triple bonds." Thus, Fig. 2 is a schematic representation of a "compound comprising dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds, and at least one sensory group bonded to the compound."

Finally, claim 19 requires "the dendritic polymer moieties having at least two different types of reactive end groups." This is described at paragraph 42 of the original specification, which states that "problems with poor solubility and excessive crystallinity . . . are solved

through the use of mixed surface PAMAM dendrimers with predetermined mixtures of two or more different kinds of end-groups (e.g., hydroxyl and amine)." As stated in paragraph 40 of the original specification, this arrangement allows preferential attachment of diacetylene functional groups via amide linkages, while providing "a moderate degree of disorder" which improves "the solubility of diacetylene dendrimer network precursors prior to intermolecular polymerization." The "reduced crystallinity of these materials facilitates deposition of coherent films on a variety of substrates such as glass, quartz, silicon, paper, plastic, cellulose and nitrocellulose." Intermolecular polymerization refers to the polymerization of the diacetylene moieties (see paragraph 15 of the original specification) to form the alternating conjugated double and triple bond linkages between the dendritic polymers.

Thus, the original application, including the drawings, shows and describes the claimed "compound comprising dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds, and at least one sensory group bonded to the compound, the dendritic polymer moieties having at least two different types of reactive end-groups."

It is believed that claims 2-12 were rejected under 35 U.S.C. §112, first paragraph, because they were dependent from rejected claim 1 (which has now been canceled), and for no other reason. This is consistent with the fact that these claims correspond identically with the claims originally in the application, and therefore cannot be rejected on grounds that the claims contain subject matter which was not described in the specification, since original claims are part of the original specification. Similarly, the rejection of claims 17-30 appears to be inadvertent, in as much as these claims are substantially identical in content to claims included in the originally filed application.

Rejection Under 35 U.S.C. §112, Second Paragraph

Claims 1-12 and 15-30 were rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner had objected to the expressions "cross-linked material," "dendritic polymer blocks" and "a linear moiety" in claim 1; the term

"cross-linked material" in claims 15-18; and the term "change in fluorescent properties" in claim 30.

These rejections have been overcome by the above amendments, in which claim 1 has been canceled, claim 19 has been rewritten in independent form without the terms which are regarded as indefinite, the expression "cross-linked" has been deleted from the claims 13, 15 and 18, and the expression "colorimetric" has been deleted from claim 25. It is respectfully submitted that all of the claims have now been amended to include only terminology that particularly points out and distinctly claims the subject matter, thereby complying with the requirements of 35 U.S.C. §112, second paragraph. In particular, the expression "cross-linked material" has been deleted and replaced with the expression "dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds," "dendritic polymer blocks" has been deleted and replaced with the expression "dendritic polymer moieties," and the expression "a linear moiety" has been replaced with the more definite expression "a moiety having alternating conjugated double and triple bonds."

It is respectfully submitted that the claims have now been amended to clearly and distinctly identify subject matter which the Applicants regarded as their invention in the original application, using definite terminology, from which those having ordinary skill in the art can precisely determine the metes and bounds of the invention. Accordingly, it is believed that the claims are now in full compliance with the provisions of 35 U.S.C. §112, second paragraph.

Provisional Obviousness-Type Double Patenting Rejection

Claims 13-16 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting. Applicants will respond to an obviousness-type double patenting rejection in the event that claims of the copending United States Patent Application No. 10/068,378 are patented.

Prior Art Rejections

Claims 13-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over each of the following: Lee et al. (*Polymer Preprints* 2002), Sui et al. (*Colloids and Surfaces* 2000) or Balogh et al. (*Macromolecules* 1999), in combination with each of the following: Ribi (U.S.

Patent No. 5,622,872), Charych et al. (U.S. Patent No. 6,022,748) or Charych et al. (U.S. Patent No. 6,001,556).

The Examiner has relied on each of the primary references (Lee et al., Sui et al. or Balogh et al.) to show that diacetylene functionalized dendritic compounds are known in the art, and on each of the secondary references to "establish that it is well known in the art to attach biomolecules to this type of conjugate for their potential applications in molecular recognition, . . . chemical sensors." The Examiner had taken the position that it would have been obvious to modify the known conjugates to contain a terminal biomolecule moiety "with the expectation of obtaining a useful UV detectable biosensor."

The rejections have been overcome by the above amendments which require that the dendritic polymer moieties have "at least two different types of reactive end-groups." None of the prior art references teach or suggest preparation of a compound having dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds and at least one sensing group bonded to the compound, wherein "the dendritic polymer moieties have at least two different types of reactive end-groups." As stated in the original application (paragraph 40), the use of two different end-groups having different chemical reactivity allows "selective covalent attachment of diacetylene lipids to some or all of the end-groups of a first type, while leaving all of the reactive groups of a second type unaffected, thereby creating a moderate degree of disorder which improves solubility of a coating composition used to prepare the claimed compounds." The reduced crystallinity facilitates deposition of coherent films on a variety of substrates. The prior art does not disclose these advantages, and does not provide any other motivation for preparing a compound as claimed in which the dendritic polymer moiety has two different types of functional groups. For that matter, the prior art does not provide motivation for bonding a sensory group to a compound comprising dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds. A teaching that biotin or other sensory groups can be bonded to polymer surfactants (Ribi) or to diacetylene polymers encapsulated in a porous sol-gel glass (Charych et al.), combined with the statement in Sui et al. that certain classes of dendrimers have "potential applications" in the field of chemical sensors, does not suggest bonding of a sensory group to a different type of compound comprised of dendritic polymer

moieties linked to one another by a moiety having alternating conjugated double and triple bonds. Certainly, teaching that other classes of dendritic polymers have potential applications in the field of biosensing is not an enabling disclosure, and does not create an expectation of success. Regardless, use of two different types of reactive end-groups, one for attachment of diacetylene moieties or other moieties capable of reacting with each other to form linkages having alternating conjugated double and triple bonds between the dendritic moieties, and a second type of functional group for imparting reduced crystallinity and improved solubility to provide improved coating properties, thereby facilitating deposition of a sensory coating film on various substrates, is not taught or suggested by the prior art. The prior art only establishes a vague notion that dendritic polymers as a class have potential for use in the field of biosensing. Clearly, the prior art technology was not sufficiently evolved to allow those of ordinary skill in the art to contemplate various technical considerations, such as coating properties.

During the above-referenced interview with the Examiner, the Examiner suggested that sensory groups typically or inherently have multiple reactive sites. Applicants would not dispute this point. However, the claims are not specifically directed to sensory groups having multiple reactive sites, but instead are directed to compounds including dendritic polymer moieties and sensory groups, in which the dendritic polymer moieties, not the sensory groups, have at least two different types of reactive end-groups (not including the unreacted diacetylene groups of claim 13, or the reacted diacetylene groups of claim 19 that constitute linking moieties having alternating conjugated double bonds). With this in mind, it is respectfully submitted that while there is already a lack of motivation in the prior art for a compound having dendritic polymer moieties linked to one another by a moiety having alternating conjugated double and triple bonds, and at least one sensory group bonded to the compound, there is a complete absence of motivation for the claimed compound in which the dendritic polymer moieties have "at least two different-types of reactive end-groups." The prior art completely fails to recognize any advantages, attach any relevance to, or suggest the use of two or more different types of reactive end-groups on the dendritic polymer moieties.

Claims 1-12 and 17-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sui et al. in combination with Ribi, Charych et al. '748 or Charych et al. '556.

For the reasons generally set forth above, it is respectfully submitted that the claims distinguish over the prior art by requiring that the dendritic polymer moieties have "at least two different types of reactive end-groups." As indicated above, the use of two different-types of end-groups (e.g., amine and hydroxyl) facilitates attachment of diacetylene moieties to the first type (e.g., amine) of terminals, while terminals of a second type (e.g., hydroxyl) are unreacted to impart reduced crystallinity, improved solubility, and improved film deposition properties. These features and advantages are neither taught nor suggested by the prior art.

CONCLUSION

In view of the above amendments and remarks, it is respectfully submitted that the application is in condition for allowance and notice of the same is earnestly solicited.

Respectfully submitted,

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EXHIBIT 1

Moiety

From Wikipedia, the free encyclopedia.

- In chemistry, a **moiety** is a specific segment of a molecule. For example, aniline has a phenyl and an amino moiety. Ethidium bromide also has both of these.
- In anthropology, **moiety** is a term used to describe each descent group in a culture which is divided exactly into two descent groups.
- Julius Caesar uses the term moiety in William Shakespeare's *Antony and Cleopatra* after he learns of the death of Antony:

The breaking of so great a thing should make
A greater crack. The round world
Should have shook lions into civil streets
And citizens to their dens. The death of Antony
Is not a single doom; in the name lay
A moiety of the world.

Caesar's message symbolizes the gravity of Antony's death, as it represented the triumph of Rome — and of Western civilization — over Cleopatra and Egypt.

Retrieved from "http://en.wikipedia.org/wiki/Moiety"